Maximizing Science, Minimizing Cost: The Magellan Extended Mission

by

Daniel T. Lyons[1]

By mapping more than 98% of the surface of Venus, the Magellan Project has successfully completed the Prime mission objective to map more than 700/0 of the surface of Venus using a left-looking Synthetic Aperture Radar which doubled as a radiometer. An Altimeter mapped the topography of 95°/0 of the planet by interleaving bursts in between the SAR bursts. During the first two extended mission cycles, where a cycle is the 243 days required for Venus to rotate once about its spin axis, the Magellan Project collected a significant amount of stereo and opposite side (right-looking) image data. During the fourth extended mission cycle, high-resolution gravity data was collected for a full 360° longitude band near the equator. The periapsis of the initial 8,500 km by 280 km radar orbit was propulsively lowered to about 175 km for cycle 4. Altitudes during cycle 4 and beyond were low enough for atmospheric density measurements using the observable effects of drag. Radio science occultation experiments were also conducted, which gave temperature, pressure, and H_2SO_4 concentrations down to the limits of critical refraction. After successfully aerobraking the spacecraft into a 541 km by 197 km nearly-circular orbit, a "Lean-Mean" flight team will map the global gravity field at high resolution from a low altitude.

This paper gives a brief description of the Magellan mission to date and describes some of the exciting opportunities for extracting further science for a very minimal cost of a few million dollars per year by taking advantage of an existing space asset and an experienced and highly motivated Magellan flight team. Because development, training and launch costs have already been paid for, maximizing the use of existing resources is an extremely cost effective method for obtaining science data for a minimal incremental cost.

[1] Member of the Technical Staff, Jet Propulsion Laboratory, California Institute of Technology, M.S. 230-216, 4800 Oak Grove Dr., Pasadena CA 91109. (818) 393-1004.

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